REMARKS/ARGUMENTS

[Request one month extension of time]

By way of the foregoing amendments, the Applicants have amended claims 1, 5, 9, 15, 19, 21, 25, 29, 35, 37, 39, and 40. Former claims 3, 4, 6-8, 10, 11, 16, 18, 24, 26-28, 30, 31, 36, 38, and 41-47 have been cancelled, without prejudice or disclaimer to the subject matter contained therein. New dependent claims 48-53 have been added to the application and depend from either independent claim 1 or 21. New independent claim 54 and dependent claims 55-59 have been added to the application. Following entry of the amendments, the present application contains 3 independent claims and 36 total claims. In the Applicants' respectful submission, no excess claim fees fall due as a result of this amendment since the application contains fewer than the 47 claims presented in the application at the time of filing and for which excess claim fees have already been paid.

The amendments to independent claims 1 and 21 have been made specify that the voltage detector generates the output signal when the AC magnetic field induces a voltage in the antenna that exceeds the threshold voltage. These claims have also been amended to recite an integrating delay circuit coupled between the voltage detector and the switch for integrating the output signal and to specify that the switch is responsive to the integrating delay circuit. The limitations added to independent claims 1 and 21 were formally found in the dependent claims. For example, reference may be made to claims 4, 10, and 11 of the application as originally filed. The amendments to claims 15 and 35 have been made to incorporate the subject matter of former independent claims 16 and 36, respectively, which have now been cancelled.

Newly added claims 48 and 51 specify that the voltage detector and switch are configured to draw no bias current from the battery when in a standby mode and

that the receiver only draws semiconductor leakage currents from the battery when in the standby mode. Ample support for this amendment may be found throughout the specification including paragraph [0037]. New dependent claims 49 and 52 specify that the voltage detector includes a rectifying transistor and an amplifying transistor and that the transistors are configured to draw no bias current in the absence of the voltage exceeding the threshold voltage. Again, ample support may be found throughout the specification and reference may be made in particular to Figure 2. New dependent claims 50 and 53 specify that the integrating delay circuit comprises a resistor and a capacitor configured to prevent operation of the switch until the AC magnetic field has been received for at least a predetermined duration. Ample support for this amendment may be found throughout the specification and, in particular, in paragraph [0034]. New independent claim 54 and its dependent claims relate to a deployable device. The subject matter of these new claims may be found throughout the specification as originally filed and the limitations found therein are mirrored in other claims of the application.

The Applicants respectfully submit that the foregoing amendments introduce no new matter to the application.

The Examiner's Office Action of April 28, 2006 includes a rejection of claims 11, 19, 31, and 39 under 35 U.S.C. § 112, 2nd paragraph. Claims 11 and 31 have been cancelled and the subject matter of these claims has been incorporated into the independent claims. Claims 19 and 39 have been amended so as to depend from their respective independent claims. In the Applicants' respectful submission, these amendments address the Examiner's objections.

The Office Action also included a rejection of claims 1, 4-8, 15-19, 21, 24-28, 35-39, 41-43, and 45-46 under 35 U.S.C. § 103(a) as being obvious having regard to Woodall et al. in view of Sharpe et al. Claims 2-3, 20, 22-23, 40 and 44 were

rejected under 35 U.S.C. § 103(a) as being obvious having regard to Woodall et al. in view of Sharpe et al. in further view of Colarossi et al. Finally, claims 9-14, 29-34, and 47 were rejected under 35 U.S.C. § 103(a) as being obvious having regard to Woodall et al. in view of Sharpe et al. in further view of Fryer. Many of the Examiner's rejections rely upon these references in combination with "common general knowledge". The Applicants have carefully considered the Examiner's rejections, but respectfully traverse those rejections and ask that the Examiner reconsider his position in view of the foregoing amendments and the following remarks.

The present application, as claimed in independent claims 1, 21, and 54 is directed to a low-cost, low-power switch for coupling a battery to a load in response to detection of a magneto-inductive transmission. The present application discloses a circuit for achieving long-term passive deployment of an electronic device that remains receptive to a triggering magneto-inductive field over a long period of time. The major problem with prior art systems/device is they drain significant battery current while in standby mode awaiting a triggering instruction. This prevents long-term deployment of such devices.

The present application discloses a device that detects and responds to an AC magnetic field using an antenna and voltage detector for sensing the AC magnetic field. The voltage detector is configured such that it only generates an output signal when the AC magnetic field induced in the antenna exceeds a threshold voltage. This prevents minor transient magnetic fields from inadvertently causing operation of the detector and thereby draining battery resources. The device further includes a switch coupled in series with the load battery that responds to an integrating delay circuit that receives the output signal from the voltage detector. By providing an integrating delay circuit, the device ensures that the AC magnetic field is received for at least a predetermined duration before triggering the switch to couple the load

to the battery.

In one embodiment, the present application ensures long-term low-power operation by implementing the voltage detector and semiconductor switch using normally-off semiconductors operating in cut-off mode and configured to draw no bias current from the battery while the device is in a standby mode. Only upon receipt of an AC magnetic field significant enough to induce a voltage in the antenna above the threshold voltage will bias current be applied to the semiconductors of the voltage detector so as to turn on the semiconductors and cause them to switch to an active mode and begin drawing current from the battery. While in standby mode, the device draws only semiconductor leakage currents from the battery. As a result, the device may be deployed for extended periods of time with a relatively small battery.

The Woodall reference cited by the Examiner relates to a magneto-inductive fuse in a firing device. In particular, Woodall et al. describe an interconnected set of line charges and other ordinance items that may be launched from a landing craft in, for example, an amphibious assault. Woodall et al. propose the use of magneto-inductive communications between the landing craft and the fuse to exchange arming and firing commands and other status information in an effort to ensure that arming and firing of the fuse only occurs when the landing craft has reached a safe separation distance. The use of magneto-inductive communications instead of RF communications is seen as advantageous in view of the ability for magneto-inductive transmissions to permeate water, mud, sand, earth, *etc.*

Figure 3 of the Woodall et al. reference provides details of the fuse design. Nowhere in Figure 3 or the accompanying description is there an indication of a voltage detector, an integrating delay circuit and/or a semiconductor switch. Moreover, the Applicants note that there is no reason for Woodall et al. to implement his magneto-inductive fuse in such a manner as to achieve low power operation. The Woodall et

al. reference contemplates the deployment and, very shortly thereafter, detonation of an ordnance. Woodall et al. do not propose long-term deployment of an ordnance that may be later, perhaps years later, triggered by magneto-inductive transmission. That Woodall et al. do not contemplate long-term deployment is evidence from the fact that one of the objectives of their device is to enable the landing craft to achieve safe separation distance following deployment of the ordnance before firing. Accordingly, the Applicants respectfully submit that a person of ordinary skill in the art reviewing the Woodall et al. reference would have no motivation to modify the teachings of Woodall to provide for a low power implementation. Woodall et al. provide no motivation for implementing a receiver having a voltage detector and integrating delay circuit as claimed in the present application.

The Sharpe et al. reference relates to electronic toll commerce (ETC) for vehicles travelling on toll roads. In particular, Sharpe et al. describe an ETC tag or transponder responses to RF communications from a toll plaza. In particular, Sharpe et al. describe a multi-stage wake-up procedure wherein an analog portion of the transponder monitors continuously for the trigger signal from the toll plaza and thereafter causes the remainder of the circuit to wake-up and respond. In column 6, at lines 40-45, Sharpe et al. specify that the circuit looks for high frequency modulation within the received signals in order to ensure it is receiving an RF trigger signal relating to an ETC transaction. Sharpe et al. acknowledge that ETC tags and transponders may be battery-less relying upon backscatter modulation to communicate with the toll plaza and relying upon a continuous-wave RF transmission from the toll plaza to power and energize the transponder circuit.

The Sharpe et al. reference relates to RF communications for electronic toll commerce. Sharpe et al. do not propose the use of magneto-inductive communications nor would one of ordinary skill in the art be inclined to adapt the

teachings of Sharpe et al. to magneto-inductive communications. ETC transponders for toll transactions are not intended to operate in the same harsh operating conditions as the fuse for firing device described in the Woodall et al. reference. Moreover, Woodall et al. teach away from the use of RF technology due to the shortcomings of this type of communication in the military operating environment. As such, one of ordinary skill in the art would not be inclined to adopt the teachings of Sharpe et al. and apply them to the device described by Woodall et al. In any event, even if combined, the Shape et al. reference fails to cure the deficiencies and shortcomings in the teachings of Woodall et al. with regard to the limitations in the independent claims 1, 21, and 54 of the present application.

For these reasons, the Applicants respectfully submit that Woodall et al. and Sharpe et al., taken alone or in combination, fail to support rejection of independent claims 1, 21, and 54 under 35 U.S.C. § 103(a). The Applicants, therefore, respectfully request that the Examiner withdraw his rejections based upon Woodall et al. and Sharpe et al.

The Colarossi et al. reference referred to by the Examiner relates to a circuit design intended to ensure that temperature variations in bias currents within an RF amplifier do not significantly degrade performance of the amplifier at different operating temperatures. Colarossi et al. is particularly directed to vehicular driver integrity check systems, such as a keyless entry system. From the circuit diagram on Figure 1, it will be noted that transistors within the circuit are biased into an active position and draw bias current from the battery while in a standby mode. Accordingly, in the standby mode, the Colarossi et al. circuit draws bias current from the battery.

The Colarossi et al. reference describes a low power radio frequency amplifier. It is intended for use in connection with radio frequency communications. Accordingly,

the Applicants respectfully submit that a person of ordinary skill in the art would not be inclined to modify the Woodall et al. teachings to incorporate the teachings of Colarossi et al. given that Woodall et al. reject the use of RF communications. Moreover, as noted above, Woodall et al. do not contemplate a system or device requiring long-term deployment and consequent low power operation. Therefore, one would not be inclined to turn to the Colarossi et al. in modifying the teachings of Woodall et al.

Even if one were to combine the teachings of Woodall et al. and Sharpe et al. with Colarossi et al., one would not arrive at the system or device claimed in the present application. None of the references teach an integrating delay circuit coupled between the voltage detector and a switch for integrating the output signal from a voltage detector.

The Fryer reference discloses an RF-controlled solid state switch. The circuit shown in Figure 3 of the Fryer reference bears a number of similarities to the circuit disclosed in the present application; however, it differs in some fundamental respects. Admittedly, Fryer's circuit includes an antenna and a voltage detector, where the voltage detector is formed using transistors in the same manner as the voltage detector described in the present application. However, Fryer does not teach or suggest an integrating delay circuit as claimed in the independent claims of the present application. In the Office Action, the Examiner claims that Fryer teaches a delay circuit having an output resistor and output capacitor. The Applicants respectfully note that the circuit of Figure 3 includes no integrating delay circuit for integrating the output signal from the voltage detector. Capacitors C2 and C3 in combination with any of the resistors shown in Figure 3 are not designed so as to function as an integrating delay circuit. Moreover, there is no motivation for a person of ordinary skill in the art to modify Fryer's teachings to provide for an integrating delay circuit. Fryer is not interested in ensuring receipt of an AC RF field

for a predetermined duration so as to eliminate transience. As is illustrated in Figures 4A-4G, Fryer aims to trigger his switch based upon the leading edge of the AC signal. Once the signal is received, the circuit remains on with transistors Q4 and Q5 saturated as explained in column 4, lines 50-75. Receipt of a second signal turns off the circuit as described at column 5, lines 22-49. In other words, Fryer describes a bi-stable switch.

Fryer intends for his switch to be used in connection with RF communications at a frequency well above the cut-off frequency of transistor Q2. If one were to adapt the Fryer circuit for use with a low frequency AC magnetic signal, the frequency of the received signal that would be well below the cut-off frequency of transistor Q2 and the Fryer circuit would fail to function for its intended purpose. Accordingly, adapting the Fryer circuit to operate with magneto-inductive technology would destroy it for its purpose. Moreover, Fryer specifically counsels against magnetically actuated switches as set out in column 1, lines 33-37.

For all of these reasons, the Applicants respectfully submit that a person of ordinary skill in the art would not combine the teachings of Fryer with the Woodall et al. reference. Woodall et al. provide no motivation to achieve low power draw from the battery and do not contemplate long-term deployment. Fryer specifically counsels against magnetically actuated switches and proposes a circuit design that would not function if used in association with low frequency AC magnetic signals. Moreover, even if one of ordinary skill in the art were to combine the teachings of Woodall et al. with Fryer (with or without the teachings of Sharpe et al.), one would not arrive at the invention taught in the present application. In particular, neither reference provides a teaching or suggestion regarding an integrating delay circuit between the voltage detector and the switch.

For all of the foregoing reasons, the Applicants respectfully submit that independent

claims 1, 21 and 54, and by extension all dependent claims, are non-obvious in view of Woodall et al. in combination with any of the three other cited references. Accordingly, the Applicants respectfully request reconsideration andwithdrawal of the Examiner's rejections under 35 U.S.C. § 103(a).

Respectfully submitted,

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